The effect of financial literacy courses and their teachers on student achievement

José Manuel Cordero
(Universidad de Extremadura)

María Gil*
(Universidad Autónoma de Madrid)

Francisco Pedraja
(Universidad de Extremadura)

Abstract

The aim of this research is to explore whether the implementation of specific courses about financial basic concepts at schools has a significant impact on the ability demonstrated by students to apply their accumulated knowledge and skills to real-life situations involving financial issues and decisions. To do this, we explore the rich set of comparative data about the countries participating in the assessment of Financial Literacy in PISA 2012, which includes 18 of the 70 participant countries in this wave of PISA. Our empirical analysis is based on a difference-in-differences approach in which we compare the results of the same students between two subjects (differences between financial literacy and reading). We assume that the distribution of students across schools does not depend on the availability of financial education, thus we can estimate the effect of the treatment as the difference between the performance of students in schools where financial education courses are available and those attending schools where they are not. Our results suggest that there is a significant and positive effect of those courses on student achievement, regardless of which type of training course is employed to teach those financial concepts.

Keywords: Education policy, Cross-country study, Financial literacy, Difference-in-differences

*Author for correspondence: maria.gil@uam.es, Phone: + 34 914973524. UDI Estadística, Facultad de CC. Económicas y Empresariales, Campus de Cantoblanco. 28049 Madrid, Spain

1. Introduction

The global and persistent crisis that economies around the world have been suffering during the last years has increased the concern about the financial literacy of citizens in many countries. More and better-educated people on financial issues are expected to be a spillover with a positive impact in economic and financial stability. Being aware of this, one of governments' strategies is to aim young people. Over the last years, many countries are developing different plans to introduce or reinforce the provision of financial literacy in their systems, via the national educational system or combined with some other policies. Despite this, it is only in recent years that some governments have started to introduce contents related to Financial Education (hereafter FE) in their school curriculum.

And there is not a unique strategy: very few countries have a well-developed framework in order to introduce financial competencies (besides the Anglo-Saxon countries, the Czech Republic, Shanghai-China, Estonia or the Flemish Community in Belgium), some other provide FE of some kind, and some other have developed some pilot programs to test the introduction of financial competences in the curriculum (Spain, Colombia, Israel or Italy). The cross-curricular is the most common approach, linking financial concepts with some other learning areas, instead of including it as a separate subject. Introducing some more unevenness in this scheme, schools may have flexibility in integrating FE into the curriculum, and teachers may have flexibility to include or not aspects of financial literacy within their subjects.

In this scenario, there is not still enough evidence to support which are the best ways to achieve better financial skills in young people. Though some countries with well structured courses dedicated to FE may show good results in financial literacy in PISA (Shanghai-China, Belgium, Czech Republic), when deepening in the analysis, one may find out that there is not a clear and direct relationship between finance courses and a worthy financial behavior in future decision making (Fernandes, Lynch and Netemeyer, 2014). Likewise, some authors argue that providing additional training in mathematics might lead to greater financial outcomes (Cole et al., 2013). In this context, the aim of this paper is to provide empirical evidence about the effect of FE in financial literacy.

Most part of the existing literature about the effectiveness of financial education for young students concludes that it has a positive impact on financial literacy (Danes et al., 1999; Varcoe et al. 2005; Swinton, 2007; Harter y Harter 2009; Walstad et al., 2010), although there are some exceptions (Peng et al., 2007; Mandell, 2008). However, the correct identification of a causal effect requires using an econometric approach, since the characteristics of schools implementing FE courses might differ from those where those courses are not available (Fox, 2005; Lyons et al., 2006; Willis, 2008). Some previous works have tried to deal with this issue, although the available data did not allow a convincing identification strategy, thus there are still some unresolved questions.

In this paper we attempt to avoid this problem by using a difference-in-differences approach in which we compare the results obtained by the same students in two different subjects (differences between financial literacy and reading), following the suggestion made by Jürges et al. (2005). The underlying assumption is that the distribution of students across schools does not depend on the availability of financial education, thus we can estimate the effect of the treatment as the difference between the performance of students in schools where FE courses are available and those where they are not. This assumption will be discussed later in detail. Likewise, some additional analyses are provided in order to corroborate this argument.

The structure of the paper is as follows. Section 2 provides a brief literature review about the importance of FE and its effects on student outcomes. Section 3 summarizes the situation of FE in countries participating in the financial literacy test in PISA 2012, while section 4 provides a description of the dataset and the variables considered in our analysis. Section 5 explains the estimation strategy and section 6 presents the main results. Finally, section 6 concludes.

2. The importance of the Financial Education

There are different arguments to introduce FE in the educational system: the insufficient degree of knowledge of citizens in terms of economic and financial basic issues, the growing complexity and diversity of available financial products, and the expected positive spillovers of financial literacy on both individuals and society in future.

Financial skills are acquired through an educational process, being the output of both the formal education in educational institutions and some external influences (such as social networks, friends, media, etc.), so as the attitudes and aptitudes towards learning, the family background, etc. (Pérez and Mancebón, 2014). In this sense, Pinto et al. (2005) conclude that parents and schools are the main channels to obtain financial information. Moreover, in the case of Financial Literacy, the acquisition of skills can be very influenced to a greater extent (compared to the learning of any other skill) by the familiar educational level, the economic resources and the parents' degree of utilization of financial products (Lusardi and Mitchell (2007) Van Rooij, Lusardi y Alessie (2011, 2012). In this sense, Lusardi and Mitchell (2009, 2011), (Lusardi et al., 2010) demonstrate for the USA that many families lack from the basic financial knowledge, the same that some other studies for other countries support.

However, to what extent is effective to introduce financial courses in the curriculum? Do financial competencies really improve? If so, do they make individuals significantly more conscious in decision making in future? Are there any other strategies that could be more effective, such as reinforcing those concepts via other subjects? Are there some other relevant issues affecting the way of achieving financial skills? Introducing FE in the curriculum is not costless: it is necessary to change the courses design and the structure of the curriculum; there must be a non-despicable cost related to teachers training or selection; some other courses may be eliminated from the curricula; should the contents be carefully chosen (strictly speaking about finances or more related to domestic finance); and finally, it should be decided about the compulsory nature of the financial courses (for students and schools).

Answers to these questions are not straightforward: while some studies seem to confirm the positive impact of FE in financial literacy (Hospido et al., 2015; Bernheim et al., 2001; Bruhn et al., 2013, Varcoe et al., 2005, Hinojosa et al., 2009, or Lusardi and Mitchell (2009), there are some other that support the idea of providing additional training in mathematics to lead to greater financial outcomes (Cole et al., 2013). Moreover, an extensive meta-analysis conducted by Fernandes et al. (2014) analyses the relationship of financial literacy and FE to financial behaviors in 168 papers covering 201 prior studies. They find that interventions to improve financial literacy explain very

little of the financial behaviors, with weaker effects in low-income samples, concluding that, like other education, FE effects decay over time.

3. FE in countries participating in PISA 2012 financial literacy test

There are different ways in which countries implement FE in their educational systems. There are few countries where there exist a well-developed framework in order to introduce financial competencies (besides the Anglo-Saxon countries, the Czech Republic, Shanghai-China, Estonia or the Flemish Community in Belgium have established different national strategies), although they provide FE in different ways and to a different extent. Table 1 summarizes the different situation of financial education in the curricular design of all the countries participating in the financial literacy test in PISA 2012.

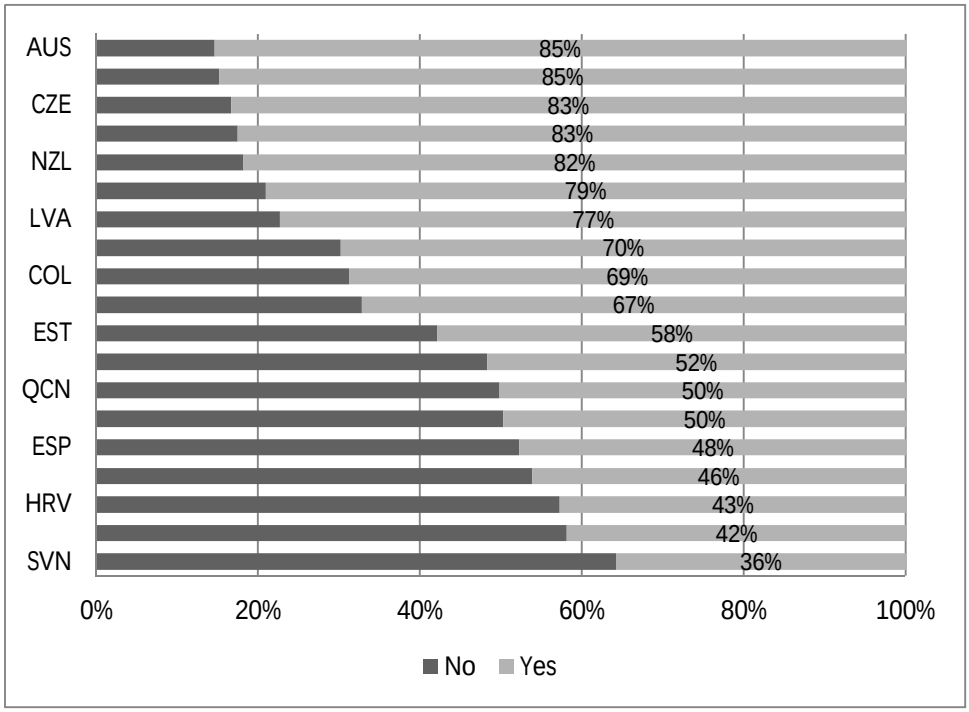
From this table we can acknowledge that there are very different ways to implement FE courses. First of all, it is important to note that FE courses are not compulsory in most part of countries. There are only some exceptions represented by schools in some specific states of the United States, Australia, Scotland and England. Regarding the manner that those courses are incorporated into the curriculum, the cross-curricular is the most common approach, i.e., financial concepts are included as a part of other learning areas (as Mathematics, Humanities or Social Sciences), whereas teaching FE as a separate subject is less common. It can also be noticed that FE might be included at different levels of the educational system, thus we can find several countries in which those concepts are studied in primary education (Latvia, Czeck Republic, Shanghai-China, Estonia or Australia), while in order educational systems they are taught during compulsory secondary education (Belgium Flemish Community, Slovak Republic, Israel, Italy or Poland). Finally, there is a small group of countries where FE courses are only provided after compulsory education (Spain and France).

The content of Table A1 (Annex) also includes information about some pilot programs implemented in different countries to incorporate financial competences in the curriculum (e.g. Spain, Colombia, Israel or Italy) before they launch a strategy for the whole country. For example, Estonia developed a National Strategy for Financial Literacy started in 2010 and a seven-year national program was launched in 2013. In

2011, the Russian government launched a comprehensive five-year nationwide project to support financial education and consumer protection. In Slovenia, the National Financial Education Program was approved by the Government in 2010. Spain designed in 2008 a Financial Education Plan, which was developed and implemented in a joint initiative of the Central Bank of Spain, the CNMV (Spanish securities supervisor) and the Ministry of Economy[1].

Given that the main focus of this research is to analyze the effect of the existence of FE courses on students´ knowledge about financial issues, it is important to determine which is the proportion of students attending courses of FE in each country. Figure 1 summarizes this information using data provided by PISA 2012 dataset. Although the average percentage of students attending those courses is relatively high for the whole sample (70% of the sample), we can notice that the variation across countries is very relevant, ranging from percentages above 80% in Australia, Belgium, United States and New Zealand to less than a half in Slovenia, Portugal, Croatia, Italy or Spain.

Figure 1. FE availability by countries



Source: Own elaboration from PISA 2012

[1] In the case of Spain, it is important to note that the pilot program was implemented for students in compulsory secondary education, but only for those schools that volunteered and after the exam of PISA 2012 (during the academic courses 2012-2013 and 2013-2014). The pilot programme is being continued and extended after an evaluation carried out during 2013.

4. Dataset

For the first time, PISA 2012 conducted an assessment of the financial literacy of 15-year-old students, which was optional for countries and economies. Eighteen countries and economies participated in the assessment of financial literacy. They include 13 OECD countries and economies: Australia, the Flemish Community of Belgium, the Czech Republic, Estonia, France, Israel, Italy, New Zealand, Poland, the Slovak Republic, Slovenia, Spain and the United States; and five partner countries and economies: Colombia, Croatia, Latvia, the Russian Federation and Shanghai-China. Around 29,000 students completed the assessment of financial literacy in 2012.

These students were assessed in addition to those who participated in the core PISA assessment (35 per school). In particular, eight additional 15-year-old students were selected randomly from students enrolled in each school to undertake the financial literacy assessment. As in other domains, financial literacy items were grouped into units comprising one or two items based around a common stimulus. The selection includes financially focused stimulus material in diverse formats, including prose, diagrams, tables, charts and illustrations. Questions about students' experiences with money matters were included at the end of the financial literacy test booklets.

Moreover, the dataset includes a wide range of variables on student background, learning experiences and attitudes as well as data about school resources and policies. Despite the richness of the available data, in our empirical approach we will only select a limited number of control variables for student and school background that have proven to have sizeable explanatory power for student achievement. Specifically, we only consider some personal variables such as the age and gender of the student, the index of socioeconomic background (ESCS[2]), as well as some variables at school level such as the ownership of schools, their location and the level of discipline.

[2] This is an indicator of economic, social and cultural status of students created by PISA analysts from three variables related to family background from students´ questionnaire: the highest educational level of any of the student's parents, the highest labour occupation of any of the student's parents and an index of educational possessions related to household economy. We consider that this variable can summarize the socioeconomic situation of the students' household, substituting the usual variables related to the parents' status, so as other proxies to their cultural background or their house conditions.

Likewise, school principals provide information about the main aspects studied in this research. In particular, data includes questions about the existence of FE courses in the school, as well as how those courses are taught (as separate or cross-curricular subject, extra-curricular activity or class teacher lessons) and whether teachers or external institutions (e.g. commercial banks, insurance companies, non-government organizations) are in charge of delivering the courses. In order to include those factors in our models, we construct several dummy variables representing each of those aspects. Table 1 contains the definition of all the variables considered in our empirical analysis and Table 2 shows the descriptive statistics of all this variables.

Table 1. Variable description

	DESCRIPTION
Dependent variable	
Diff. across subjects	Differences in PV between reading and financial literacy
Covariates at student and school level	
Gender	Dummy variable that takes value 1 if the student is a girl
Age	Age of the student
ESCS	Indicator of economic, social and cultural status of students
Private	Dummy variable that takes value 1 if the school is private (in financing and administration)
Rural	Dummy variable that takes value 1 if the school is placed in a village or small town.
Discipline Inex	Average of the individual variable DISCLIMA for the students belonging to the same school
Specific variables related to the organization of FE courses	
FE available	Dummy variable that takes value 1 when Financial education is available in the student's school
Teachpriv	Dummy variable that takes value 1 if FE is taught by a private institution
Teachpub	Dummy variable that takes value 1 if FE is taught by the public sector
TeachNGO	Dummy variable that takes value 1 if FE is taught by a NGO
Gender	Dummy variable that takes value 1 when the student is a girl
FEseparate	Dummy variable that takes value 1 if FE is taught as a separate course
FEcross	Dummy variable that takes value 1 if FE is taught as a cross sectional course
FEecon	Dummy variable that takes value 1 if FE is taught as a cross sectional course of Economy
FEmath	Dummy variable that takes value 1 if FE is taught as a cross sectional course of Maths
FEhuman	Dummy variable that takes value 1 if FE is taught as a cross sectional course of Humanities
FEextra	Dummy variable that takes value 1 if FE is taught as an extra-curricular activity
FEclass	Dummy variable that takes value 1 if FE is taught as class teacher lessons

Table 2. Descriptive statistics

	Mean	Std. Deviation	Min.	Max.
Diff. across subjects	-1.5507	69.2682	-412.74	403.47
Gender	0.4978	0.5000	0	1
Age	15.7850	0.2904	15.25	16.33
ESCS	-0.0809	0.9577	-4.91	3.11
Private	0.0446	0.2065	0	1
Rural	0.2478	0.4317	0	1
Discipline Inex	0.0038	0.6513	-2.48	1.85
FE available	0.6709	0.4699	0	1
Teachpriv	0.1192	0.3240	0	1
Teachpub	0.0501	0.2181	0	1
TeachNGO	0.0979	0.2971	0	1
FEseparate	0.2594	0.4383	0	1
FEcross	0.3476	0.4762	0	1
FEecon	0.4946	0.5000	0	1
FEmath	0.6069	0.4885	0	1
FEhuman	0.5072	0.5000	0	1
FEextra	0.1454	0.3525	0	1
FEclass	0.1874	0.3902	0	1

Besides the variable selection, the dataset needed some more treatment before being suitable for the empirical analysis in order to avoid the usual problems derived from the existence of missing values in the variables. In our case, we apply a multiple imputation method which consists of filling the missing values using an iterative proceeding of chained equations (Schaffer, 1999; Kenward & Carpenter, 2007). This method uses all the available variables in the model to estimate unobserved data according to the particular characteristics of each variable. In addition to this procedure, we apply another imputation approach to complete information about our core variable, i.e. the availability of FE courses, since we have detected several cases in which principals do not provide this information, but they answer other related questions (e.g. how those courses are taught). For those observations, we fill missing data using the responses provided for those related questions. When there is not enough available information to know whether FE is available or not, we follow a listwise imputation method, which implies a slight reduction in the original dataset.

Finally, it should be noted that, as seen in the previous section, there are two countries for which FE only exists after compulsory education in their curriculum, that is, after the PISA's age of assessment: France and Spain. In these two cases, the test would be assessing competences that in fact are to be acquired afterwards, and all the information about FE is referring to a posterior period of the curriculum. Thus, we decide to make an alternative estimation of models excluding these countries from the analysis in order to obtain more robust conclusions about the impact of FE.

5. Estimation strategy

The identification of the causal effect of FE courses on student performance is a complex task that cannot be accomplished simply through estimating differences between the average achievement in schools where those courses are available and those where they are not, even if we control for student background and other variables of interest. In this framework, traditional estimations based on ordinary least squares would be biased because the assignment of students to schools is not random. For example, children from families with greater economic and cultural capital are more likely to attend schools with better resources, in which this type of financial courses might be more likely implemented.

In order to address this issue of potential selection bias, in this paper we use a difference-in-differences (DiD) approach. This methodology is usually applied when panel data is available, thus it is possible to observe individuals in treatment and control groups at two different points in time (see Schlotter et al. 2011 for details). However, given that PISA does not provide data about the performance of students before and after receiving FE courses, we have adapted this method to an alternative framework in which we observe the performance of the same individuals in different subjects. This strategy was originally employed by Jurges et al. (2005) to identify the causal effect of central exams on student performance in Germany using TIMSS data. Other studies have used similar models based on student fixed effects to estimate the impact of teacher characteristics or practices on student performance (Dee, 2005, 2007; Schwerdt & Wuppermann, 2011¸ Bietenbeck, 2014; Zakharov et al, 2014) or the influence of instruction time on academic achievement (Rivkin & Schiman, 2015).

The underlying assumption of our estimation strategy is based on the fact that the treatment, i.e., the existence of a FE course in the school, only has influence on one dimension of student performance represented by the scores in the financial literacy test, thus the control group should be represented by students attending schools where this course is not available. Since PISA provides test results in two additional competences, mathematics and reading, we can estimate *difference-in-differences* by subject. In particular, we have selected the results in reading for comparison in order to avoid a potential source of endogeneity between the achievement in maths and financial literacy, since most part of questions in the financial literacy test includes algebraic calculations (see OECD, 2014 for details).

In this framework, the estimation strategy consists of separating the sample between students attending schools offering a FE course and students attending schools where this course was not available. The key assumption required to identify the causal effect is that the difference in the performance in both outcome variables would be identical in the absence of treatment, thus the excess on the difference in the financial literacy test in schools with financial courses must reflect the causal effect of interest.

Formally, our estimator can be described as follows. We consider two different regressions to explain the results in reading (R) and financial literacy (F):

$$y_i^R = \mu_i + X_i\beta + \varepsilon_i^R \quad (1)$$

$$y_i^F = \mu_i + X_i\gamma + C_i\delta + \varepsilon_i^F \quad (2)$$

where μ_i is a some individual specific characteristic (e.g. general ability), X_i represents a vector of covariates that might affect the performance in reading and financial literacy in a different way, C_i is a dummy variable for the availability of FE courses and ε_i^K are error terms. The DiD method basically consists of subtracting both equations:

$$D_i = y_i^F - y_i^R = X_i(\gamma - \beta) + C_i\delta + \varepsilon_i^F - \varepsilon_i^R \quad (3)$$

where δ is our parameter of interest. The most relevant advantage of this approach is that the use of differences eliminates the intrinsic characteristics of each individual (μ_i) from the equation, thus we are able to control for most part of heterogeneity on the

individual level represented by socioeconomic background or the innate intelligence. This means that each students is serving as his or her control group.

However, the interpretation of this difference as the causal effect of FE courses on financial literacy performance relies on the assumption that the expected value of the difference between both error terms is null: $E[C_i(\varepsilon_i^F - \varepsilon_i^R)] = 0$. This assumption would not be fulfilled in the case that the characteristics of students attending schools where FE courses are provided might differ from those in which courses are not available, i.e., if there is a self-selection bias into treatment. We consider that this problem does not arise in our dataset, since it is difficult to believe that parents decide between schools according to the existence of FE courses. In order to check this hypothesis, we have calculated mean differences between both sub-samples for a set of variables at student and school level (Table 3). Those values allow us to be confident about the assumption that the two samples are comparable, since the distribution of students across schools is very similar for most part of indicators. Despite these similarities, it is possible to detect a remarkable difference in the achievement between subjects (reading and financial literacy). Hence, students obtain almost the same result in reading, but there is a significant difference of almost 12 points in financial literacy.

In the context of a cross-country study, we are also interested in accounting for unobserved heterogeneity across countries that might have a different effect across subjects (Hanushek et al., 2014). For example, FE courses might have a longer tradition in some countries or they can be compulsory for schools in some others. Therefore, we have also estimated our model in a second specification considering country fixed effects.

Finally, a second main objective of the present research is to analyze whether the configuration of courses might have influence on the competences acquired by students about financial literacy. In particular, our main focus is placed on two aspects: (i) if there is some institution (private, public or non-governmental organization) involved in providing teaching FE courses; (ii) if courses are taught as a separate subject (specific course, extra-curricular activity or class-teacher lessons) or represent a part of other subjects (mathematics, humanities, business or economic courses). We test the potential influence of those factors by estimating a multiple-treatment model in which we include additional dummy variables based on responses provided by school principals.

Table 3. Differences between two subsamples depending on FE availability

Variable	FE course available		FE course not available			
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean diff.**	**t-test**
READavg	492.192	100.939	491.656	101.509	0.536	-0.020
FLITavg	494.232	102.138	482.946	95.958	11.286	-8.166***
gender	0.499	0.500	0.495	0.500	0.004	-0.602
AGE	15.791	0.289	15.772	0.291	0.019	-1.193
immig1	0.045	0.208	0.039	0.195	0.006	-1.307
immig2	0.058	0.233	0.042	0.201	0.016	-5.245**
escs	-0.081	0.941	-0.084	0.991	0.003	-0.337
fathedu	0.357	0.479	0.344	0.475	0.013	-1.907
mothedu	0.404	0.491	0.363	0.481	0.041	-1.925
fjob	0.788	0.409	0.787	0.409	0.001	-0.150
mjob	0.552	0.497	0.542	0.498	0.010	-1.412
focupa	46.039	24.615	45.620	23.771	0.419	-1.277
mocupa	52.925	27.084	53.184	27.843	-0.259	0.702
book25	0.327	0.469	0.323	0.468	0.004	-0.736
books26100	0.303	0.460	0.299	0.458	0.004	-0.748
books101200	0.167	0.373	0.168	0.374	-0.001	0.244
books201500	0.121	0.327	0.121	0.326	0.000	-0.128
books500	0.067	0.251	0.076	0.266	-0.009	1.894
private	0.049	0.215	0.036	0.187	0.013	-4.484**
rural	0.248	0.432	0.247	0.432	0.001	-0.072
CLSIZE	26.968	8.605	27.309	8.958	-0.341	1.897
DISCP	-.0077	.0049	0.027	0.666	-0.035	3.974**
truan	0.399	0.490	0.369	0.483	0.030	-1.874
skip	0.394	0.489	0.387	0.487	0.007	-1.094
disrup	0.341	0.474	0.325	0.469	0.016	-1.479
Observations	16,845		8,263			

6. Results

Table 3 presents the estimates of the model in Eq. (3) considering the whole dataset (column 1) and also the reduced dataset (column 2) without Spanish and French students. Likewise, we have estimated the same equation considering country fixed effects for each sample size (columns 3 and 4). Regressions are run separately for each pair of five plausible test score values for reading and financial literacy, although Table

only reports the mean coefficient estimates as well as the average R-squared from the five regressions performed (see OECD, 2014 for details).

Table 4 shows that there is a significant and positive effect of the existence of FE courses on better results in financial literacy independently of the sample size and the consideration of country fixed effects. The impact of participating in FE courses is higher than 10% of a standard deviation increase in financial literacy test scores in the basic model. This value reduces by approximately two thirds when country fixed effects are considered in the model, although the effects is still significant. Nevertheless, the effect is similar for both sample sizes, although it is slightly higher in the reduced sample, as we could expect.

Table 4. Effect of FE courses on student achievement

VARIABLES	(1)	(2)	(3)	(4)
FE available	10.77***	11.69***	3.340***	3.990***
	(1.029)	(1.041)	(1.082)	(1.131)
Gender	-34.45***	-34.68***	-34.17***	-34.47***
	(0.900)	(0.925)	(0.884)	(0.909)
Age	9.247***	10.45***	8.176***	8.707***
	(1.706)	(1.787)	(1.705)	(1.769)
ESCS	-1.956***	-1.953***	-1.735***	-1.860***
	(0.460)	(0.466)	(0.486)	(0.495)
Private	6.779***	5.346**	2.881	1.737
	(2.407)	(2.404)	(2.441)	(2.431)
Rural	4.400***	3.716***	5.660***	4.877***
	(1.042)	(1.041)	(1.052)	(1.052)
Discp	1.927**	1.685**	-0.557	-0.543
	(0.755)	(0.750)	(0.781)	(0.779)
Constant	-138.8***	-157.4***	-114.2***	-122.2***
	(26.93)	(28.17)	(27.22)	(28.19)
Observations	24,679	23,641	24,679	23,641
R-squared	0.071	0.074	-	-
Number of groups	-	-	18	16
COUNTRY FE	NO	NO	YES	YES

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

While the is clearly on the effect of FE availability, other parameters in the estimation are also worth noting. We can notice that all the background variables are significantly associated with the differences in test scores across subjects. Test scores in financial literacy are clearly better for boys and older students, while higher levels of

socioeconomic status are associated with better results in reading. All school variables have a positive and significant relationship with the dependent variables in the basic model (columns 1 and 2). However, only the location, with a positive coefficient for being placed in a rural area, remains as a significant covariate once we account for country heterogeneity in the model (columns 3 and 4).

Once we have tested the overall effect of FE courses on financial literacy, we estimate some alternative multiple-treatment models with the aim of examining whether there are divergences in the effect depending on who provides financial education in schools and how it is taught. Table 5 reports the estimates for the first model, which includes three additional dummies representing the participation of people from private sector institutions, public sector institutions and non-government organizations. Again, columns 1 and 2 reflect the estimation of a basic model with different sample sizes and columns 3 and 4 the estimation of parameters assuming country fixed effects for both sample sizes.

The estimated coefficient for the effect of FE courses together with these additional variables in every column is virtually identical to the former case, in which the availability of FE was included in the regression as a single treatment variable. Another relevant result is that the estimated coefficients of all the additional variables included in the equation are significant, although the direction of the effect is not the same. Hence, the effect is positive and very relevant when people from private institutions are involved in providing FE courses, while the effect is negative when those courses are taught by people working for public institutions or non-governmental agencies.

Table 5. Effect of FE courses and people providing FE on student achievement

VARIABLES	(1)	(2)	(3)	(4)
FE available	9.972***	11.07***	3.253***	3.912***
	(1.056)	(1.073)	(1.101)	(1.150)
Teachpriv	11.59***	10.82***	6.033***	5.897***
	(1.572)	(1.585)	(1.581)	(1.583)
Teachpub	-7.307***	-7.555***	-5.241**	-5.456**
	(2.265)	(2.250)	(2.248)	(2.236)
TeachONG	-4.870***	-5.359***	-1.968	-1.980
	(1.692)	(1.679)	(1.674)	(1.667)
Gender	-34.53***	-34.75***	-34.20***	-34.50***
	(0.901)	(0.926)	(0.885)	(0.910)
Age	9.093***	10.29***	8.130***	8.668***
	(1.707)	(1.790)	(1.706)	(1.771)
ESCS	-2.035***	-2.023***	-1.729***	-1.855***
	(0.460)	(0.466)	(0.486)	(0.495)
Private	6.646***	5.216**	3.002	1.871
	(2.404)	(2.401)	(2.442)	(2.432)
Rural	4.335***	3.624***	5.615***	4.817***
	(1.041)	(1.041)	(1.055)	(1.054)
Discp	1.902**	1.661**	-0.590	-0.583
	(0.754)	(0.749)	(0.780)	(0.778)
Constant	-136.3***	-154.9***	-113.7***	-121.8***
	(26.95)	(28.22)	(27.23)	(28.20)
Observations	24,679	23,641	24,679	23,641
R-squared	0.074	0.076	-	-
Number of groups	-	-	18	16
COUNTRY FE	NO	NO	YES	YES

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 presents the estimates obtained for a second specification, in which we test seven alternative multiple-treatment models to examine different manners of implementing FE courses (separate course, cross-curricular, part of an economic or business course, part of mathematics, part of humanities, extracurricular activity or class teacher lesson). For the sake of simplicity we only present the results for the basic model with all the observations, although the results are similar for other alternatives. In particular, the most relevant finding is that the effect of financial education is significant in all cases, independently of how FE is taught. However, the values of estimated parameters for each of the existing alternatives indicate that the implementation based on class teacher lessons or as a cross-curricular subject, especially as a part of mathematics, is the most effective manner of increasing financial literacy results. In

contrast, the when courses are taught as a separate subject or as a part of an economics or business course, the effect is not significant.

Table 6. Effect of different types of training courses on financial education

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gender	-34.45***	-34.53***	-34.46***	-34.55***	-34.50***	-34.39***	-34.42***
	(0.900)	(0.900)	(0.900)	(0.901)	(0.899)	(0.900)	(0.899)
Age	9.242***	8.924***	9.204***	9.294***	9.294***	9.166***	9.404***
	(1.703)	(1.704)	(1.702)	(1.706)	(1.707)	(1.705)	(1.708)
ESCS	-1.954***	-1.931***	-1.958***	-2.027***	-1.933***	-1.920***	-1.905***
	(0.461)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)	(0.460)
Private	6.770***	7.243***	6.747***	6.665***	6.778***	6.967***	6.906***
	(2.413)	(2.409)	(2.409)	(2.405)	(2.406)	(2.405)	(2.404)
Rural	4.408***	4.165***	4.439***	4.123***	4.045***	4.577***	3.848***
	(1.044)	(1.040)	(1.043)	(1.037)	(1.043)	(1.042)	(1.046)
Discp	1.925**	1.881**	1.950**	1.575**	1.824**	1.613**	1.560**
	(0.757)	(0.754)	(0.758)	(0.742)	(0.755)	(0.757)	(0.753)
FE available	10.71***	8.122***	10.49***	7.805***	8.763***	9.315***	9.412***
	(1.136)	(1.073)	(1.138)	(1.119)	(1.073)	(1.072)	(1.059)
FEseparate	0.164						
	(1.204)						
FEcross		7.378***					
		(0.975)					
FEecon			0.533				
			(1.002)				
FEmath				7.180***			
				(1.133)			
FEhuman					5.905***		
					(0.997)		
FEextra						6.638***	
						(1.260)	
FEclass							8.182***
							(1.155)
Constant	-138.7***	-134.4***	-138.2***	-141.7***	-141.0***	-137.5***	-141.7***
	(26.88)	(26.89)	(26.87)	(26.97)	(26.99)	(26.91)	(26.96)
Observations	24,679	24,679	24,679	24,679	24,679	24,679	24,679
R-squared	0.071	0.074	0.071	0.074	0.073	0.073	0.073

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

7. Conclusion

This paper attempts to provide empirical evidence about the real effects of implementing financial education at schools as a mechanism to improve the knowledge of young students about financial issues. Our empirical strategy takes advantages of the possibility of exploiting an international large-scale datasets that provides information about different educational outcomes. In particular, we exploit the information provided by the financial literacy and reading tests included in PISA 2012, the first initiative that

offers this comparable data in an international framework, adopting a DiD approach that allows us to identify a causal effect.

Our empirical findings suggest that the effect of those courses is positive and significant independently of whether we consider this variable as a single treatment variable or in a multiple-treatment model, including some additional variables related to who and how those courses are implemented. Moreover, our results indicate that those courses are more effective if they are taught by people from private institutions (e.g. banks or insurance companies) using a cross-curricular approach.

Despite this interesting result, some further research is needed in order to analyze other aspects that are beyond of the present study such as determining the necessary minimum number of hours required in order to obtain meaningful results or examining or analyze the different effects of those courses depending on whether they were provided in primary or secondary education. Unfortunately, PISA dataset does not provide enough reliable information about these aspects, but the growing development of initiatives and pilot programs involving financial education in multiple countries should allow researchers to make important progress in developing empirical evidence about these issues in the short future.

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ANNEX

Table A1. Situation of FE in countries participating in PISA 2012 financial literacy

Australia	Compulsory training of contents of FE since students begin compulsory education until 12 years old. Financial literacy was first introduced within the mathematics, English and science curricula but is also included in the draft economics and business curricula.
Belgium (Flemish Community)	Learning outcomes for secondary schools (that came into effect in 2010-11) cover typical FE topics, such as budgeting, alongside economics topics, such as labour, goods and services, welfare and poverty. They are mandatory in all secondary schools while schools can decide how and in which subjects these cross-curricular competencies should be integrated.
Colombia*	Pilot Project: Finanzas para el Cambio (Finances for Change)
Czech Republic	The Ministry of Education is in charge of defining the contents and expected outcomes of FE for primary and secondary school students education. There are different subjects in which financial contents are included.he standards focus on such topics as money, household budget management, financial products and consumer rights.
Spain*	In the first three courses of Compulsory Secondary Education there is not any specific course related to Economy of Finance. Some financial contents may be treated under a cross-sectional approach, in courses such as Social Sciences, Geography or History, but from a more historical o geographical point of view. In post compulsory education, the treatment of the FE is very uneven within the regions and schools (from 1 to 4 available courses in the Social Sciences path).
Estonia	In primary and lower secondary school, monetary and finance-related topics are incorporated in human study, social studies, crafts and home economics, as well as mathematics.
France	In High School (15 to 18 years), students enrolled in the general and scientific tracks of high schools are taught economics, social sciences and management
Israel*	Teaching FE in schools started in 2010 with a gradually expanding pilot programme for 10th-graders (15- and 16-year-old students).
Italy*	Financial and education authorities implemented an experimental programme to incorporate FE into school curricula at various levels.
Latvia	Domestic Economy as a course from primary, and when students are 10 to 12 years old.

New Zealand	Financial literacy is included in the curriculum as a theme that schools can use for cross-curricular teaching and learning programmes. It provides a context for linking learning areas, such as social sciences, mathematics and statistics, English, business studies, health and technology, and it provides a relevant context for strengthening literacy and numeracy skills.
Poland	In secondary schools, the subject "Introduction to Management of Firms" is compulsory during three courses, 2 hours per week.
Shanghai-China	Some FE topics have been integrated into the existing national curriculum since the 1970s, while schools have some autonomy in teaching FE with respect to the national curriculum. In the Pudong New Area of Shanghai-China, regular training on finance has been delivered since 2009 in primary and lower secondary schools.
Russian Federation	In 2011 the Russian government launched a comprehensive five-year nationwide project to support FE and consumer protection. The project targets low-income and vulnerable social groups as well as young people, including school and university students. As part of this project, Russia is preparing its National Strategy for FE to provide a vision and a common framework for the further development of financial literacy policies and programmes in Russia. The strategy is expected to be finalized by the end of 2014.
Slovak Republic	Independently of the track in secondary education, all schools can include in their curriculum optional subjects (maximum load 30%), such as management and entrepreneurship. in all the tracks in secondary education there is an available non compulsory course related to supporting entrepreneurship and management for young people.
Slovenia	Although there is not a compulsory course related to Economics, all schools can offer between 30 and 50% of their curriculum related to financial contents.
USA	Most states have integrated compulsory FE in their curriculum. There are differences across states in whether schools are mandated to offer courses in economics and/or personal finance.

* Countries applying pilot programs to introduce FE in the curriculum.